Fixing and Staining Nuclei.—The following methods have been found to give excellent results in the study of nuclei. The observations were chiefly made with the mother-cells of the spermatozoids of various ferns, but the nuclei of vegetative cells also gave very instructive preparations. In order to fix the nuclei, the prothallia were placed in aqueous solutions of chromic or picric acid or corrosive sublimate. The chromic acid solution should be a 1 per cent. solution; the others concentrated. In these solutions they should remain from one to two hours, though in the corrosive sublimate solution less time is required. The chromic and picric acid preparations must be washed in several waters before staining. It has been found a good plan to leave them over night in abundant fresh water before the final washing.

The sublimate preparations may be transferred to absolute alcohol, in which they should remain several hours.

The specimens are now ready for staining. The best results were obtained with hæmatoxylin and gold chloride. The secret of good hæmatoxylin staining is to use a very dilute solution—three or four drops of the prepared solution in a watch-glass full of distilled water—and to allow the specimens to remain in this for at least twenty-four hours. Strasburger is especially emphatic upon these points.

After taking the specimens from the hæmatoxylin solution, they must be passed successively through 50 per cent., 70 per cent. and absolute alcohol before mounting. Half an hour is usually sufficient for each of the alcohols. For immediate examination they may be mounted in glycerine, but for permanent preparations first in origanum oil, and then transferred to Canada balsam (dissolved in chloroform).

The gold chloride method is simpler, and I have found it to answer admirably for specimens fixed in picric or chromic acid; but with those fixed with corrosive sublimate or alcohol it has not answered so well.

A few drops of 1 per cent. gold chloride in water are placed in a watch glass almost half filled with distilled water, and the specimens are allowed to remain from one-half to one hour, the solution being kept in the dark. Strasburger recommends a trace of HCl, but with the picric and chromic acid preparations, although thoroughly washed, I found this unnecessary. The specimens are then thoroughly washed, being at the same time exposed to the light and finally mounted in glycerine. With alcoholic material hæmatoxylin was found to give the best results.

The above notes embody nothing especially new, but may be useful as a memorandum of work actually done.—DOUGLAS H. CAMPBELL, *Bonn.*

A Useful Artificial Light.—The following apparatus, recommended by Strasburger, has been found very useful in dark weather, and of course can be used at night: A glass globe about six inches in diameter is filled with a very dilute solution of ammoniated copper oxide, and suspended between a large Argand burner (gas or oil) and the microscope. The

light should be about twenty inches from the microscope, and the globe sufficiently supported so as not to oscillate. The light obtained is bright but not dazzling, and of a soft green color that is extremely agreeable to the eyes. A screen of some kind should be used to protect the eyes from the light and heat of the lamp or gas flame used. The apparatus is referred to in the "Botanische Practicum" as the *Schuster Kugel*.—D. H. CAMPBELL, *Bonn*.

The influence of heredity upon vigor.—The results of two series of experiments with the tomato plant, carried on during the past three seasons, furnish a forcible illustration of the influence of the health of the parents upon progeny in plants.

In the fall of 1883 a single plant was noticed in a row of tomatoes that appeared more feeble, and had more of its fruits decayed than any other. A few seeds were gathered from some of the sound fruits of this feeble plant, and at the same time, a few from sound fruits on a neighboring plant that appeared healthy and vigorous. The following spring the two samples of seeds were sown, and the young plants transplanted to adjoining rows in the garden. It was a surprise to find that in habit the plants of each row closely resembled the parents, *i. e.*, the progeny of the feeble plant was also feeble, even more so than was the parent, while that of the vigorous plant appeared entirely healthy. The difference in the two rows was so marked that, but for the unquestionable identity of the fruit, one would scarcely have thought it possible that they could be of the same variety. The same selections of seed were continued through 1885 and 1886, with like results. The past season the progeny of the feeble plant of 1883 scarcely exceeded one-fourth the size of that of the vigorous one. The plants lay prostrate on the ground, with discolored and shriveled foliage, and with the fruits fully one-half decayed before frost came. This decay is a soft rot, quite different from the black rot that so often affects tomatoes. The fruit becomes soft and collapses without changing color, the skin finally bursts, permitting the contents to flow out, when the skin dries without detaching itself from the plant.

In the second series of experiments plants were grown through three successive generations from seed taken from quite immature fruits. In one instance seeds were gathered in every case from fruits that had not commenced to change color toward ripeness; in the other they were taken from entirely ripe fruits. It is of interest to observe that the effect of the immature seed upon the vigor of the progeny was precisely similar to that of the seeds from the enfeebled plant above noted. The plants grew more and more feeble, until they failed to attain more than a fourth the size of those grown from ripe fruit.

Several varieties of tomatoes now cultivated show evidences in their manner of growth of having been originated by the selection of too imma-